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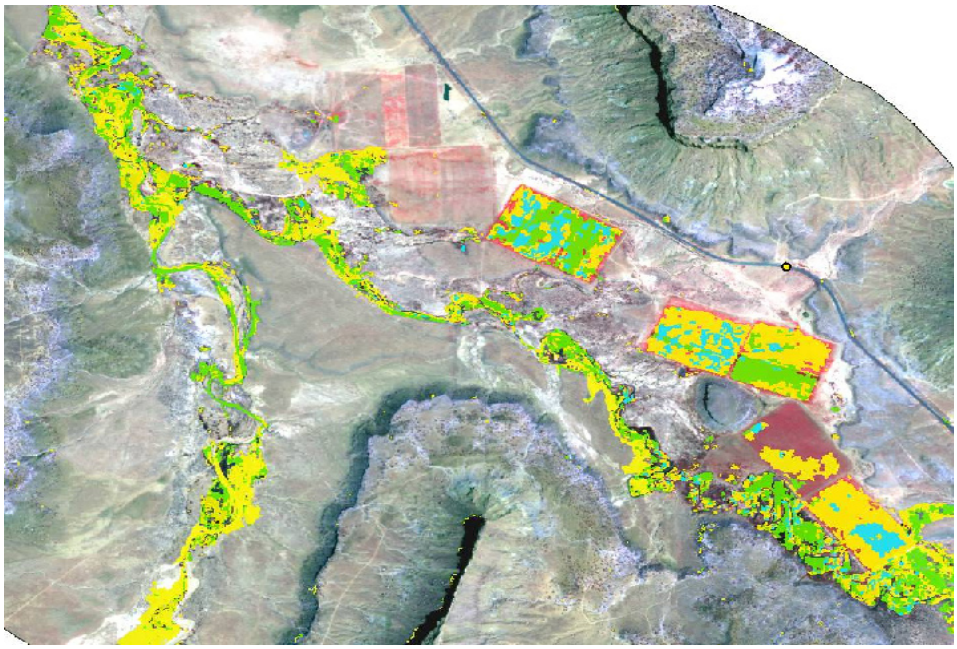
Rocky Mountain Geographic Science Center

Mapping Tamarisk with High-Resolution Satellite Imagery

Background

Since its introduction as a landscape plant in the early 1800s, Tamarisk has replaced native vegetation and filled riparian areas with dense, monotypic stands. Ongoing drought conditions increase concerns about the presence of this aggressive, invasive plant in many areas of the western United States.

The BLM Monticello Field Office in San Juan County, Utah has a long-term, integrated weed control program to control Tamarisk and other plants in riparian areas. Key to the success of this program is the identification of Tamarisk populations. As an alternative to traditional ground surveys, classification of remotely sensed data may provide a cost effective, expeditious mapping solution.



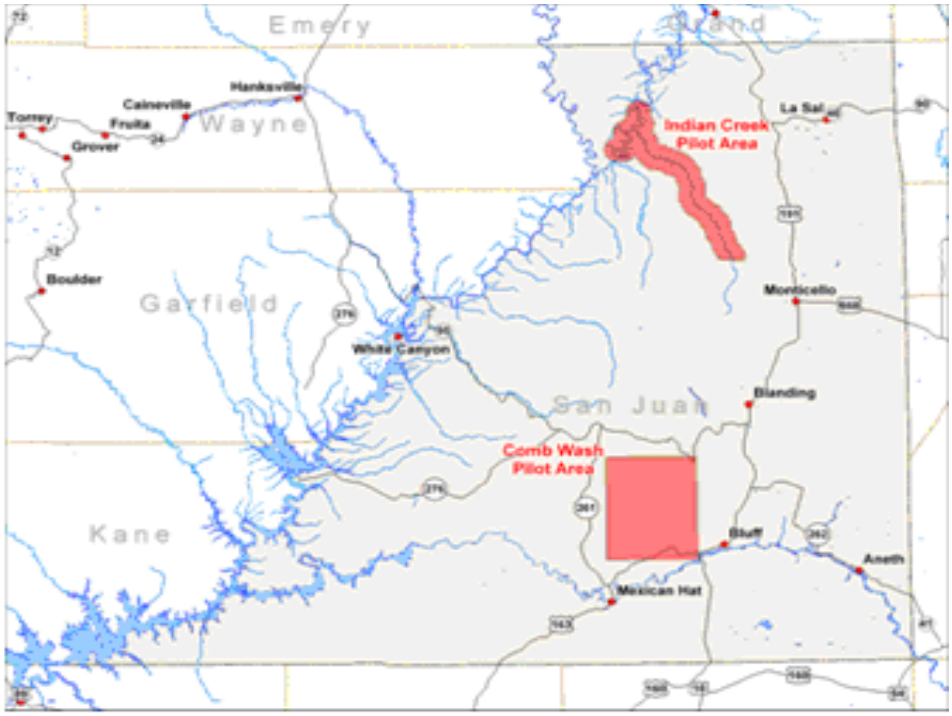
The USGS Rocky Mountain Geographic Science Center has used a combination of techniques and data types to identify tamarisk populations, including: identification of at-risk areas, image segmentation, and supervised classification. The results allow land managers to determine priority areas for the weed control program and helps field crews locate treatment areas. Using these procedures, the effectiveness of the weed control program can be monitored and in subsequent years, the techniques can be applied to other areas.

Methods

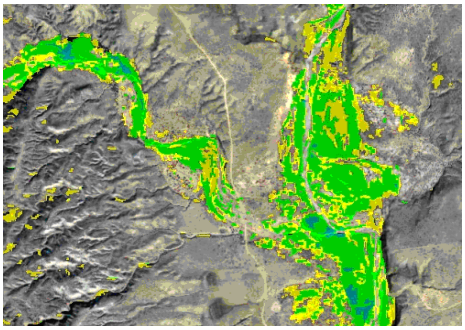
For the initial phase of the project, two pilot areas were identified -- Comb Wash, in the center of the county and Indian Creek, a tributary of the Colorado River. The goal of the pilot projects was to determine whether tamarisk could be identified using readily available imagery and cost-effective methods. Comb Wash was selected as the first pilot area because it is relatively accessible for field work, and has an established tamarisk population, while still maintaining a mix of cottonwoods, sages, and other shrubs. Indian Creek is a similar area and was used to test the methods developed in Comb Wash.

QuickBird multi-spectral and panchromatic data from Digital Globe was obtained for the pilot areas. The imagery was orthorectified using ERDAS OrthoBASE and the multi- spectral, normalized difference vegetation index (NDVI), and 10-meter elevation data were input into eCognition software.

Small image objects were created and classified as either vegetation or non-vegetation. This classification was used to create larger objects that would constrain the species based classification to vegetated areas. Based on field samples, the vegetation class was broken down into Tamarisk, Cottonwood, and Sage/Other Vegetation areas.

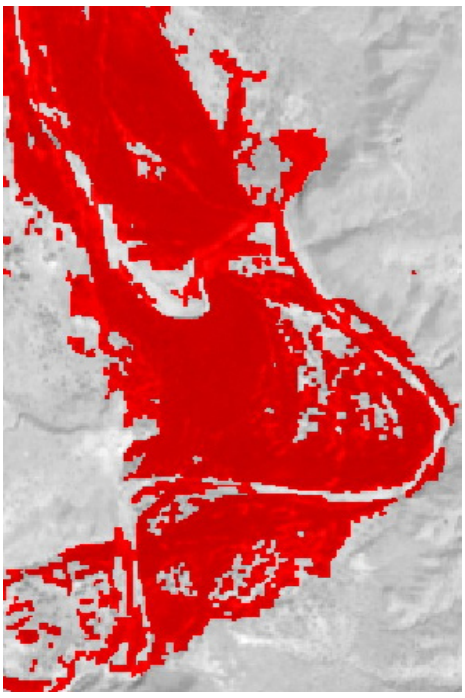


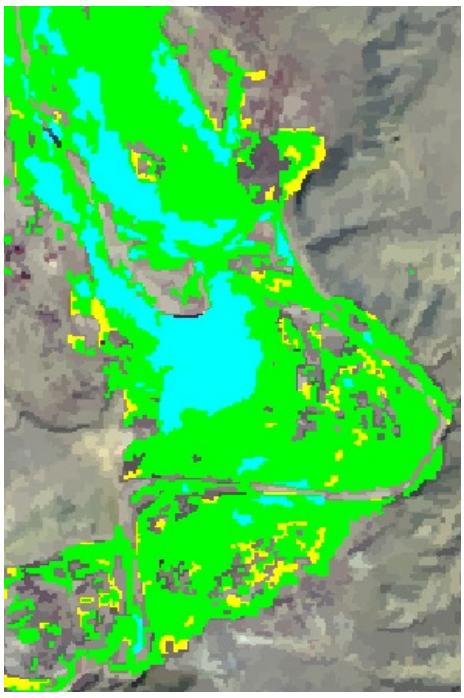
The final classification was field checked in June 2004 and an accuracy assessment showed that more than 75% of the Tamarisk polygons were classified correctly. Some minor adjustments were made to the classification parameters and the same methods were used to classify the vegetation in Indian Creek.



The vegetation in Indian Creek included agricultural fields and shrub species that were not present in Comb Wash. However, the general classification methods that were developed provided a framework that allowed Tamarisk to be identified in this area. Some modifications needed to be made to account for the presence of Shady Oak and the range of elevation in the area.

Overall, the methods developed provide the ability to locate tamarisk stands with minimal field work and methods that can be modified for a variety of areas.





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